Claims

1. Electrodynamic apparatus, comprising:

a stator subassembly including a plurality of spaced apart stator core members configured as extending from a stator backiron, said stator cores and stator backiron being integrally formed of magnetically soft pressure shaped processed ferromagnetic particles which are generally insulatively associated, said stator core members and stator backiron being disposed about an axis, a plurality of stator windings extending about corresponding said stator core members at winding core portions and extending thereon to core flux interaction portions, and two or more winding leads extending from said plurality of stator windings to respective exit termini;

an encapsulation structure formed around said stator subassembly of molded rigid injection moldable thermoplastic surrounding at least said stator windings and the space between said windings, having a central opening region disposed about said motor axis extending from a rotor operational region and configured having one or more shaft bearing mounts integrally formed therein and symmetrically disposed about said axis;

one or more shaft bearings mounted upon corresponding said bearing mounts;

a shaft mounted with said one or more shaft bearings for rotation about said axis and extending into said rotor operational region; and

a rotor within said rotor operational region, mounted for rotation with said shaft and defining a working gap with said core flux interaction portions.

2. The electrodynamic apparatus of claim 1 in which:

said encapsulation structure further comprises an integrally formed wall structure extending outwardly from said stator windings and axially above said core flux interaction portions to define a motor case.

3. The electrodynamic apparatus of claim 1 in which:

said encapsulation structure is further configured to surround said stator backiron.

4. The electrodynamic apparatus of claim 2 in which:

said encapsulation structure further comprises a control platform support formed with said wall structure at a location axially above said core flux interaction portions; and further comprising:

a control platform mounted upon said control platform support.

5. The electrodynamic apparatus of claim 4 in which:

portions of said subassembly exit windings are supported with said integrally formed wall structure, and said exit termini are coupled to said control platform.

6. The electrodynamic apparatus of claim 2 in which:

said stator subassembly core flux interaction portions are configured having radially outwardly disposed surfaces; and

said encapsulation structure wall structure is configured to radially rearwardly support said core flux interaction portions radially outwardly disposed surfaces and to extend between the interstices thereof to provide lateral support.

7. The electrodynamic apparatus of claim 1 in which:

said electrodynamic apparatus is a motor;

said encapsulation structure is configured having an integrally formed gearhead mount co-axially aligned with said central opening region;

said shaft extends to said gearhead mount; and

further comprising a gearhead coupled in driven relationship with said shaft and coupled in driving relationship with a motor output shaft.

8. The electrodynamic apparatus of claim 7 in which:

said gearhead is a planetary gearhead configured with a sun gear mounted upon said shaft, a rotatable platform fixed with said output shaft and supporting more than one freely rotatable planet gears engaged with said sun gear and a ring gear; and

said ring gear is integrally formed with said encapsulation structure gearhead mount.

9. The electrodynamic apparatus of claim 7 in which:

said gearhead is a planetary gearhead configured with a sun gear mounted upon said shaft, a rotatable ring gear fixed with said output shaft and more than one planet gears mounted on shafts extending from said gearhead mount region.

10. The electrodynamic apparatus of claim 7 in which:

said gearhead is a multi-stage planetary gearhead.

11. The electrodynamic apparatus of claim 8 further comprising:

a motor cap coupled with said encapsulation structure and supporting said output shaft for rotation.

12. The electrodynamic apparatus of claim 1 in which:

said stator subassembly stator windings are each wound about electrically insulative bobbins which are mounted over said stator core members at said winding core portions; and

said exit winding leads extend axially along and spaced from said stator cores upwardly from and supported by said bobbins.

13. The electrodynamic apparatus of claim 1 in which:

said encapsulation structure one or more bearing mounts includes a radially inwardly tapering bearing mount surface having a curvature for supporting a self aligning sleeve bearing; and

further comprising a self aligning sleeve bearing positioned at said inwardly tapering bearing mount surface and supporting said shaft for rotation.

14. The method of assembling an electrodynamic apparatus, comprising the steps of:

(a) providing a stator subassembly including a plurality of spaced apart stator core members configured as extending from a stator backiron and disposed about an axis, a plurality of stator windings extending about corresponding stator cores at winding core portions and extending thereon to core flux interaction portions, and exit winding leads extending to respective exit termini;

(b) locating said stator subassembly within an insert mold tool die cavity radially aligned with respect to said axis and axially located;

(c) shutting off against the radially facing surfaces of said core flux interaction portions to define a rotor operational region;

(d) shutting off to define a central opening region disposed about said axis and extending from said rotor operational region and said tool being configured to define one or more bearing mounts symmetrically disposed about said axis;

(e) shutting off against said exit winding leads or said exit termini;

(f) injecting plastic within said die cavity to form an encapsulation structure;

(g) pulling apart said insert mold tool to provide a plastic encapsulation structure in structurally supporting association with said stator subassembly;

(h) positioning one or more bearings within said one or more bearing mounts;

(i) providing a rotor and drive shaft;

(j) positioning said rotor at said rotor operational region and said drive shaft within said one or more bearings; and

(k) coupling said exit lead termini with a circuit.

15. The method of claim 14 in which:

said step (c) further comprises the step:

(c1) shutting off to define a control platform support located axially outwardly from said rotor operational region; and

said step (k) further comprises the step;

(k1) mounting a control platform supporting said circuit upon said control platform support.

16. The method of claim 14 in which:

said steps (c) and (e) comprises the step of inserting a removable insert into the said core flux interaction region and said exit winding leads region to provide shut off against said radially facing surfaces of said core flux interaction

portions and said exit winding leads said removable insert being located along the axis of said mold tool die cavity.

17. The method of claim 14 in which:

said electrodynamic apparatus is a motor;

said step (d) further comprises the step: (d1) shutting off to define a gearhead mount co-axially aligned with said central opening region;

further comprising the step:

(l) mounting a gearhead within said gearhead mount in driven relationship with said drive shaft, said gearhead being coupled in driving relationship with an axially outwardly extending output shaft.

18. The method of claim 17 in which:

said step (l) further comprises the step (l1) providing said gearhead as a planetary gearhead configured with a sun gear mounted upon said drive shaft, a rotatable platform fixed to said output shaft and supporting more than one freely rotatable planet gears engaged with said sun gear and engagable with a ring gear; and

said step (d1) defines said ring gear as being integrally formed within said gearhead mount.

19. The method of claim 17 in which:

said step (l) further comprises the step (l2) providing said gearhead as a planetary gearhead configured with a sun gear mounted upon said drive shaft, a rotatable ring gear fixed to said output shaft and more than one planet gears mounted on shafts extending from said gear head mount region.

20. The method of claim 17 further comprising the steps:

(l) providing a motor cap having a cap bearing configured for receiving said output shaft; and

(m) mounting said motor cap over said gear mount, said cap bearing supporting said output shaft for rotation.

21. The method of claim 14 in which:

said step (a) provides said stator subassembly stator cores and stator backiron as being integrally formed of magnetically soft pressure shaped processed ferromagnetic particles which are generally mutually insulatively associated.

22. The method of claim 14 in which:

said step (d) defines said one or more bearing mounts as having a radially inwardly tapering bearing mount surface having a curvature for supporting a self aligning sleeve bearing; and

said step (h) positions said one or more bearings as a self aligning sleeve bearing.

23. An encapsulated wound stator assembly having an axis and employable with an electrodynamic apparatus, comprising:

an upstanding stator formed of magnetically soft pressed processed ferromagnetic particles that comprises a stator backiron region, a stator wire winding region and a stator flux interaction region;

a winding assembly mounted over said upstanding stator at said wire winding region and having at least two wires or wire extensions exiting said winding assembly;

a thermoplastic encapsulation structure formed around said upstanding stator wire winding assembly except for a rotor region radially confronting said stator flux interaction region, said at least two wires or wire extensions exiting said encapsulation structure, said encapsulation structure having a central opening region disposed about said axis formed to define a bearing mount or bearing assembly mount.

24. The wound stator assembly of claim 23 in which:

said encapsulation structure further comprises a region of gear teeth disposed about said axis.

25. The encapsulated wound stator assembly of claim 24 in which:

said gear teeth are located at least substantially within said upstanding stator.